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LABORATORY SPRAYING AND WASHING APPARATUS

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In the study of spray residues under laboratory conditions it is necessary to have a means whereby the sprays may be applied on plants, glass plates, and other surfaces and also a means for simulating the washing effect of rain. One of the methods often employed for this purpose includes the use of a paint sprayer, which atomizes the spray by means of compressed air. The equipment necessary is expensive, considering the combined cost of the paint sprayer, air compressor, and control valves. Also it is not readily portable.

Apparatus has been developed which is of low cost and is readily portable. Furthermore, it permits the use of a wide variety of spray nozzles to produce sprays of varying character and thus more nearly duplicate sprays as they are used in the field. The same equipment used for applying spray mixtures may also be used to simulate the washing effect of rain by merely substituting water for the spray mixture.

Description and Operation of Apparatus

To operate the apparatus, cocks D and F are closed and cock C is opened, after which the spray mixture is poured into the percolator (A), and the motor (G) is started. The spray mixture flows from the percolator into the gear pump (B), from which it is forced back into the bottom of the percolator through a tube attached to cock C. This tube is closed at the end, and near its end it has two holes of 1/16" diameter, which are drilled at right angles to each other. This arrangement produces vigorous agitation of the spray mixture and reduces foaming and swirling to a minimum. By partly closing cock C the pressure in the system is increased. Constant pressures up to 50 pounds per square inch may be maintained by a simple adjustment of cock C. Higher pressures are obtainable by increasing the speed of the pump. The spray nozzle (E) is operated by opening cock D. To clean the apparatus, cock F is opened and the excess spray is discharged. This is followed by sufficient clear water to remove the last trace of the spray mixture.

Since the capacity of the gear pump is far greater than the output from the spray nozzle, it is evident that this apparatus is essentially a device for the continuous removal of a portion of a uniform flow of a spray mixture which is under constant pressure. The device is constructed of standard parts, is portable, and may be used anywhere that electricity is available. The type of spray delivered may be varied through a wide range by means of changes in the pressure, location of the spray nozzle in relation to the object to be sprayed, and the use of various types of nozzles. In this way sprays may be applied under hydrostatic pressure in a manner which closely duplicates field spraying. Furthermore, the same apparatus may be used to simulate the effect of rain on spray residues by simply substituting water for the spray mixture.

The spraying apparatus may be used in various ways, one of which is illustrated in figure 1. This shows a spray hood which contains apparatus for rotating glass plates through the spray.

The spray hood is in the form of a cube with one face omitted, each dimension being 4 feet. It is assembled from sections made of lumber 2 inches square and covered with galvanized iron. The sections are bolted together. The galvanized iron in the bottom is in the form of a pan 4' x 4' x 2" and has a 1" pipe flange in one corner to accommodate a drain pipe. The galvanized iron on the sides extends on the inside to the bottom of the pan.

The device for rotating objects through the spray is mounted on a 1" x 12" board placed diagonally in the hood. It is raised above the pan by means of cleats in order to allow the removal of the excess liquids through the drain. The rotating device consists of a turntable (J), to which is attached a support (H) for a rack (I). Power is transmitted to the turntable by a motor (K) by means of belts and pulleys which reduce the speed of the rack to 2 r.p.m. This speed may be varied by changes in the sizes of the pulleys. The rack consists of eight metal rods 9 inches in length, which are attached to the top of the support. A Parrot paper clip is attached to the end of each rod to hold the glass plates in a vertical position. The plates are supported in the clips by means of 3-sided prisms, with a saw cut in the top edge into which the bottom edge of the glass plate is fitted. The glass plates are 5" x 7" photographic plates, with one corner ground to provide a space for identification marks.

The support and rack may be removed and a circular table substituted in cases where it may be desirable to spray plates while they are in a horizontal position or to spray potted plants or other material.

When in operation, the pulleys, motor, and turntable are protected from the spray by means of a metal cover.



Figure 1.—Laboratory spraying and washing apparatus.
The necessary pipes and fittings are shown. The apparatus is mounted on a portable wooden base.

Parts of apparatus for producing spray:

- A. Glass percolator, 2-liter capacity.
- B. Gear pump, $\frac{3}{8}$ ", with 6" pulley.
- C. Cock, $\frac{3}{8}$ ", to control pressure.
- D. Cock, $\frac{1}{4}$ ", to control nozzle.
- E. Vermorel spray nozzle.
- F. Cock, $\frac{3}{8}$ ", to drain apparatus.
- G. Motor, $\frac{1}{4}$ hp., 1,725 r. p. m., with 2" pulley.

Parts of apparatus for rotating glass plates:

- H. Support for the rack.
- I. Rack for holding glass plates.
- J. Turntable.
- K. Small motor.

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